HISTORIC PROPERTY INVENTORY FORM

State of Washington, Department of Community Development
Office of Archaeology and Historic Preservation
111 21st Avenue Southwest, Post Office Box 48343
Olympia, Washington 98504-8343 (206)753-4011

IDENTIFICATION SECTION

Field Site No. 231-Z **OAHP No.** _____ **Date Recorded** 15 Sept 1995
Site Name Historic Isolation Building Rev. 26 May 1998
Common Plutonium Metallurgy Facility
Field Recorder P.K. Hoeft/M.S. Gerber/I.C. Lindsay
Owner's Name U.S. Department of Energy, Richland Operations Office
Address P.O. Box 550
City/State/Zip Code Richland, WA 99352

Status

- [x] Survey/Inventory
- [ ] National Register
- [ ] State Register
- [ ] Determined Eligible
- [ ] Determined Not Eligible
- [ ] Other (HABS, HAER, NHL)
- [ ] Local Designation

Photography Hanford Photography Lab Neg. #
Photography Neg. No. 95080369-39CN; D7729; D7730
(Roll No. & Frame No.)
View of Exterior facades; Hist. interior equipment
Date August 1995; 1940s

Photo at right: 95080369-39CN
North and east exterior facades

Classification [ ] District [ ] Site [x] Building [ ] Structure [ ] Object
District Status [x] NR [ ] SR [ ] LR [ ] INV
Contributing [x] **Non-Contributing** [ ]
District/Thematic Nomination Name Hanford Site Manhattan Project and Cold War Historic District

Description Section

Materials & Features/Structural Types

Building Type Industry
Plan Irregular
Structural System Concrete Block
No. of Stories Two

Roof Type

- [ ] Gable
- [ ] Hip
- [x] Flat
- [ ] Pyramidal
- [ ] Monitor
- [ ] Other (specify)
- [ ] Gambrel
- [ ] Shed

Cladding (Exterior Wall Surfaces)

- [ ] Log
- [ ] Horizontal Wood Siding
  - Rustic/Drop [ ]
  - Clapboard [ ]
- [ ] Wood Shingle
- [ ] Board and Batten
- [ ] Vertical Board
- [ ] Asbestos/Asphalt
- [ ] Brick
- [ ] Stone
- [ ] Stucco
- [ ] Terra Cotta
- [x] Concrete/Concrete Block
- [ ] Vinyl/Aluminum Siding
- [ ] Metal (specify)
- [ ] Other (specify)

Roof Material

- [ ] Wood Shingle
- [ ] Wood Shake
- [ ] Composition
- [ ] Slate
- [ ] Tar/Built-up
- [ ] Tile
- [ ] Metal (specify)
- [x] Other (specify) Concrete with tar & gravel finish
- [ ] Not visible

Foundation

- [ ] Log
- [ ] Post & Pier
- [ ] Stone
- [ ] Brick
- [ ] Not visible
- Concrete
  - [ ] Block
  - [x] Poured
  - [ ] Other (specify)

Integrity (Include detailed description in **Description of Physical Appearance**)

		Intact	Slight	Moderate	Extensive
Changes to plan		x			
Changes to windows	n/a				
Changes to original cladding		x			
Changes to interior				x	
Other (specify)	Equipment				x

LOCATION SECTION

Address 231-Z Building, 200 West Area
City/Town/County/Zip Code Richland/Benton County/99352
Twp 12 N **Range** 25 E **Section** 1 **1/4 Section** SW **1/4 1/4 Sec** SE
Tax No./Parcel No. _____ **Acreage** _____
Quadrangle or map name Gable Butte, WA - 7.5 min. series
UTM References Zone 11 **Easting** _____ **Northing** _____
Plat/Block/Lot _____
Supplemental Map(s) _____

High Styles/Forms (Check one or more of the following)

- [ ] Greek Revival
- [ ] Gothic Revival
- [ ] Italianate
- [ ] Second Empire
- [ ] Romanesque Revival
- [ ] Stick Style
- [ ] Queen Anne
- [ ] Shingle Style
- [ ] Colonial Revival
- [ ] Beaux Arts/Neoclassical
- [ ] Chicago/Commercial Style
- [ ] American Foursquare
- [ ] Mission Revival
- [ ] Spanish Colonial Revival/Mediterranean
- [ ] Tudor Revival
- [ ] Craftsman/Arts & Crafts
- [ ] Bungalow
- [ ] Prairie Style
- [ ] Art Deco/Art Moderne
- [ ] Rustic Style
- [ ] International Style
- [ ] Northwest Style
- [ ] Commercial Vernacular
- [ ] Residential Vernacular (see below)
- [x] Other (specify) Industrial Vernacular

Vernacular House Types

- [ ] Gable Front
- [ ] Gable Front and Wing
- [ ] Side Gable
- [ ] Cross Gable
- [ ] Pyramidal/Hipped
- [ ] Other (specify)

NARRATIVE SECTION

Study Unit Themes (check one or more of the following)

[ ] Agriculture	[ ] Conservation	[ ] Politics/Government/Law
[ ] Architecture/Landscape Architecture	[ ] Education	[ ] Religion
[ ] Arts	[ ] Entertainment/Recreation	[ ] Science & Engineering
[ ] Commerce	[ ] Ethnic Heritage (specify) _____	[ ] Social Movements/Organizations
[ ] Communications	[ ] Health/Medicine	[ ] Transportation
[ ] Community Planning/Development	[ ] Manufacturing/Industry	[x] Other (specify) Manhattan Project/Cold War Eras
	[ ] Military	[x] **Study Unit Sub-Theme(s)** Plutonium Finishing, Main Processing; Administrative Support; Research and Development; Social History

Statement of Significance

Date of Construction 1944 Architect/Engineer/Builder E.I. du Pont de Nemours and Company

[x] In the opinion of the surveyor, this property appears to meet the criteria of the National Register of Historic Places.

[x] In the opinion of the surveyor, this property is located in a potential historic district (National and/or local).

The 231-Z Plutonium Metallurgy Building was originally called the Concentration Building or Isolation Building. It was constructed in 1944 and began "hot" operations in early 1945. Its function for the next 12 years was to house the final step in the purification of plutonium nitrate which had been processed in the Hanford Site's bismuth phosphate radiochemical separations facilities. The purified and concentrated plutonium nitrate was then shipped to the Los Alamos Site for conversion to metallic plutonium and shaped into weapons parts.

When the 234-5Z Plutonium Finishing Plant became operational at Hanford in 1949 with the capabilities of making and shaping metallic Pu, most of the Pu nitrate product (or AT solution) began to go to that facility. Soon thereafter, the process development laboratories from the 231-Z and 234-5Z Buildings were consolidated into a single laboratory in the 234-5Z Building. Throughout the early and mid-1950s, research was underway to develop separations processes at Hanford that would eliminate the need for the 231-Z Building's concentration/isolation function. In January 1956, the PUREX (plutonium uranium extraction) Plant started up and produced a Pu product solution that was supposed to be suitable for direct delivery to the Plutonium Finishing Plant, thus bypassing the 231-Z Building. (See continuation sheet)

Description of Physical Appearance

The 231-Z Building is located in the western portion of the 200 West Area of the Hanford Site, midway between T-Plant (221-T Building) and U-Plant (221-U Building) and approximately 300 yards north of the Plutonium Finishing Plant. Originally this structure was a two-story, flat roofed, reinforced concrete building with 8-inch concrete block panels and 4-inch and 8-inch concrete block partitions. Overall dimensions were 147 feet by 189 feet, 10 inches by 24 feet, 6 inches tall, with a total square footage of 27, 964. A one-story ventilation and equipment room ran along the west end of the building. The west side of the ventilation and equipment room contained fixed louvers protected by an 8 inch concrete barricade wall located approximately 4 feet from the face of the louvers and extending 4 feet above the roof. The 231-Z facility had no windows.

In World War II, the 231-Z facility contained a total of 57 rooms including 20 laboratories, several process and chemical receiving and storage rooms, offices, change room facilities designed to accommodate 190 employees, air conditioning equipment, a distilled water system, ventilation and exhaust systems, and a compressed air system (Figure 1). Six of the laboratories were known as "cell laboratories," and served as the major centers where the World War II process was carried out (see Statement of Significance) (Figure 2). All of the rooms except for one rest room were located on the first floor with the second floor serving as a pipe and service loft containing duct work and filters for the ventilation and exhaust systems.

The 231-Z Building foundations consist of reinforced concrete piers with spread footings and concrete walls with spread footings. Floors are reinforced concrete varying from four to 12-inch thickness. The walls and ceilings of the cell laboratories and Vaults A and B are reinforced concrete one inch thick. Roofs are likewise reinforced concrete four inches thick and are covered with built-up felt, gravel surface roofing containing numerous openings for intake and exhaust ducts. The interior surface of all concrete block walls and partitions were plastered except for the sample test room, instrument room, and one office. These latter rooms were lined and sealed with 1 inch acoustic tile board. The lunch room also was sealed with tile board. The walls, floors, ceilings, and equipment in many of the laboratories were painted with "Amercoat" (a thick, contamination-fixant paint containing epoxy), to obtain non porous surfaces. Other rooms were painted with standard interior wall paint. The building was fitted with 12 single and five double freight doors and equipped with extended monorails for the removal of equipment. (See continuation sheet)

Major Bibliographic References

Demiter, J.A.; D.R. Duncan; W.E. Meeuwsen; R.W. Reddinger; and M.S. Zvonar. 1991. *Historical Report on Retrievable Stored Division of Military Application Equipment at the Hanford Site.* WHC-IP-0791. Westinghouse Hanford Company, Richland, WA. (See continuation sheet)

Statement of Significance (Continuation Sheets, 231-Z Building)

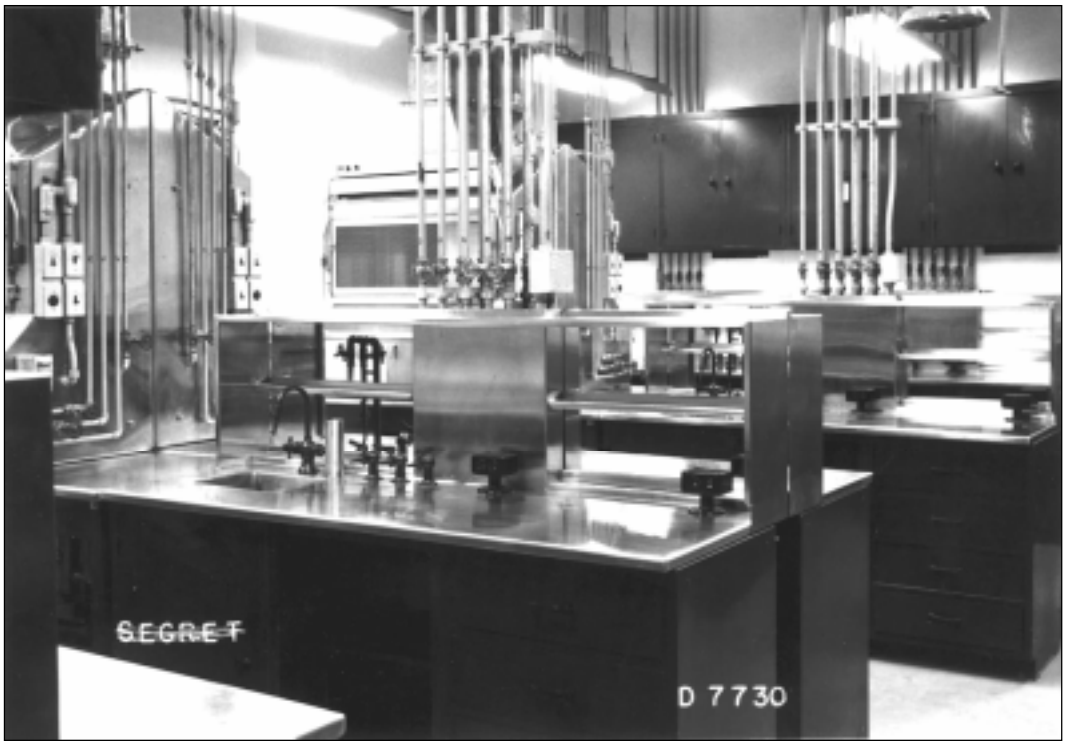

Figure 1: Control Laboratory in Room 35 (no date, WWII; Neg. #D7730)

However, radiation levels in the early PUREX product solutions were unacceptably high, and these solutions had to be transferred to the 231-Z Building for fission product decontamination throughout much of 1956. After PUREX operations were modified in mid-1956 to provide for further fission product decontamination, this product could be successfully delivered directly to the Plutonium Finishing Plant. The 231-Z facility ceased its concentration and isolation functions in early 1957.

In the meantime, in 1955-1956, part of the 231-Z Building had been modified to accommodate a new Plutonium Fabrication Laboratory, replacing a small Plutonium Metallurgy Laboratory that had been operating in the 234-5Z Building for the previous few years. As soon as the 231-Z facility terminated its original functions in early 1957, the Pu metallurgy facilities in the 231-Z Building were expanded to fill virtually the entire building.

Project Whitney, a classified experimental weapons fabrication project of the Atomic Energy Commission, occupied portions of the 231-Z facility between the mid-1950s and 1960s. The Commission's Division of Military Application also funded other experimental weapons design work in

the building in support of the weapons testing program at the Nevada Test Site. Also during this period, primary development work in reactor fuels containing plutonium and other alpha-emitting materials also took place in the 231-Z facility.

Figure 2: Cell Laboratory #1 (no date, WWII; Neg. #D7729)

In 1975, the Division of Military Application began phasing out the weapons design work in the 231-Z Building, and a major cleanout of glove boxes and other Pu-contaminated equipment was undertaken during 1978-82. During that time, part of the building was converted to laboratory space for materials research and other non-plutonium work, and large parts were converted to office space. In 1982, the 231-Z Building was considered as a site for the Department of Energy's Laser Isotope Separations project. However, funding was not available to retrofit the old facility with the necessary equipment in keeping with modern codes and standards. In 1994, a national study to determine places and facilities where plutonium residues might be vulnerable to environmental release, theft, or other disturbance identified the 231-Z Building as one in need of cleanout and then decontamination and decommissioning.

The activities undertaken in the 231-Z Building have made a significant contribution to the Hanford Site's Manhattan Project and Cold War missions of plutonium production and weapons and fuels development. Plutonium processed through the 231-Z Isolations Building were used in the bombs detonated at the Trinity Test Site in July 1945 and over Nagasaki a month later. The building's subsequent plutonium processing work contributed to weapons production for the nation's Cold War nuclear arsenal until 1957, and much of the specialized plutonium metallurgy work in

connection with weapons development is still classified. The facility also played a supporting role in plutonium fuels development for the commercial nuclear industry and for the Liquid Metal Fuel Breeder Reactor research program. It is therefore the conclusion of the U.S. Department of Energy that Building 231-Z is eligible for inclusion in the National Register of Historic Places under Criterion A as contributing property within the Hanford Site Manhattan Project and Cold War Era Historic District.

Description of Physical Appearance (Continued)

In 1955-56 interior modifications were made to Rooms 47-50 to transform them into a Plutonium Fabrication Laboratory, although no structural changes occurred. During the next two years, this laboratory space was expanded as the six cell laboratories (Rooms 1-6) underwent a general cleanout and decontamination in accordance with building mission changes. In 1959, a 5000-ton hydraulic press was installed to accommodate new experiments in plutonium fabrication.

A one-story 3400 square foot office wing was added on the south side of the 231-Z Building during 1968-69. The addition was constructed of concrete block, with a flat roof of built-up tar and gravel, and windows along the exterior office walls. It was isolated from the laboratory area by air locks. Another 3200 square feet was added onto the east side of the southern addition in 1979. Additionally in 1968, 2800 feet of existing laboratory, lunch room, locker room and restroom space in the existing building was converted to office space. At the same time, piping modifications below-grade were undertaken to connect the building to a new process waste disposal crib (216-Z-16) for 231-Z Building process wastes. In 1973-74, a 3700 square foot, one-story concrete block addition was placed on the north side of the 231-Z Building to serve as a consolidated storage and maintenance facility.

Major Bibliographic References (continued)

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Travis, J.E. 1955. *Plutonium Fabrication Laboratory (Project No. CG-645).* Directive No. HW-361, Modification #1. U.S. Atomic Energy Commission, Richland, WA.

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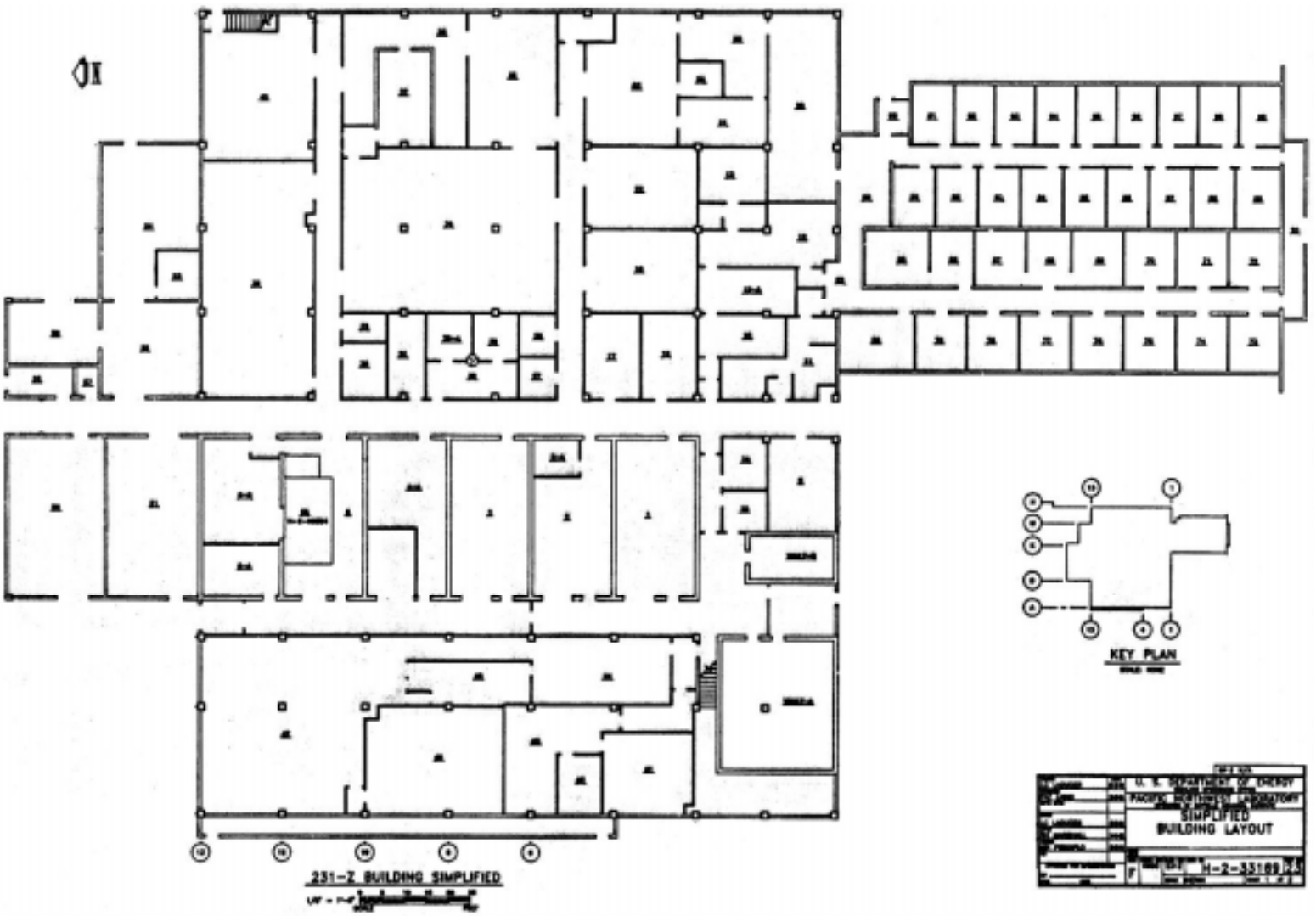
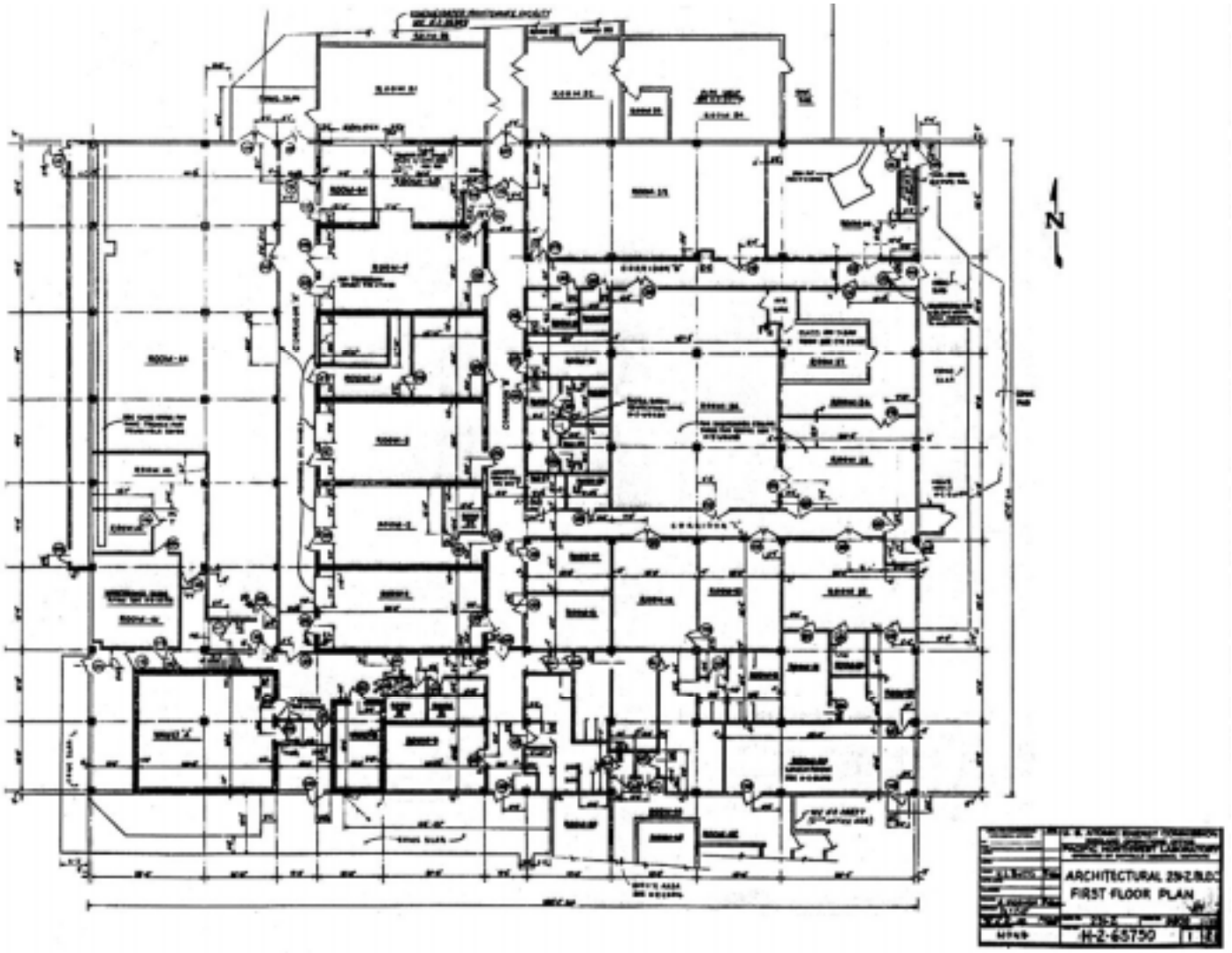
Williams, D.G. 1966. *Office Addition - 231-Z Building (Project No., BAP-010).* Directive No. AEC-270, Modification #1. U.S. Atomic Energy Commission, Richland, WA.

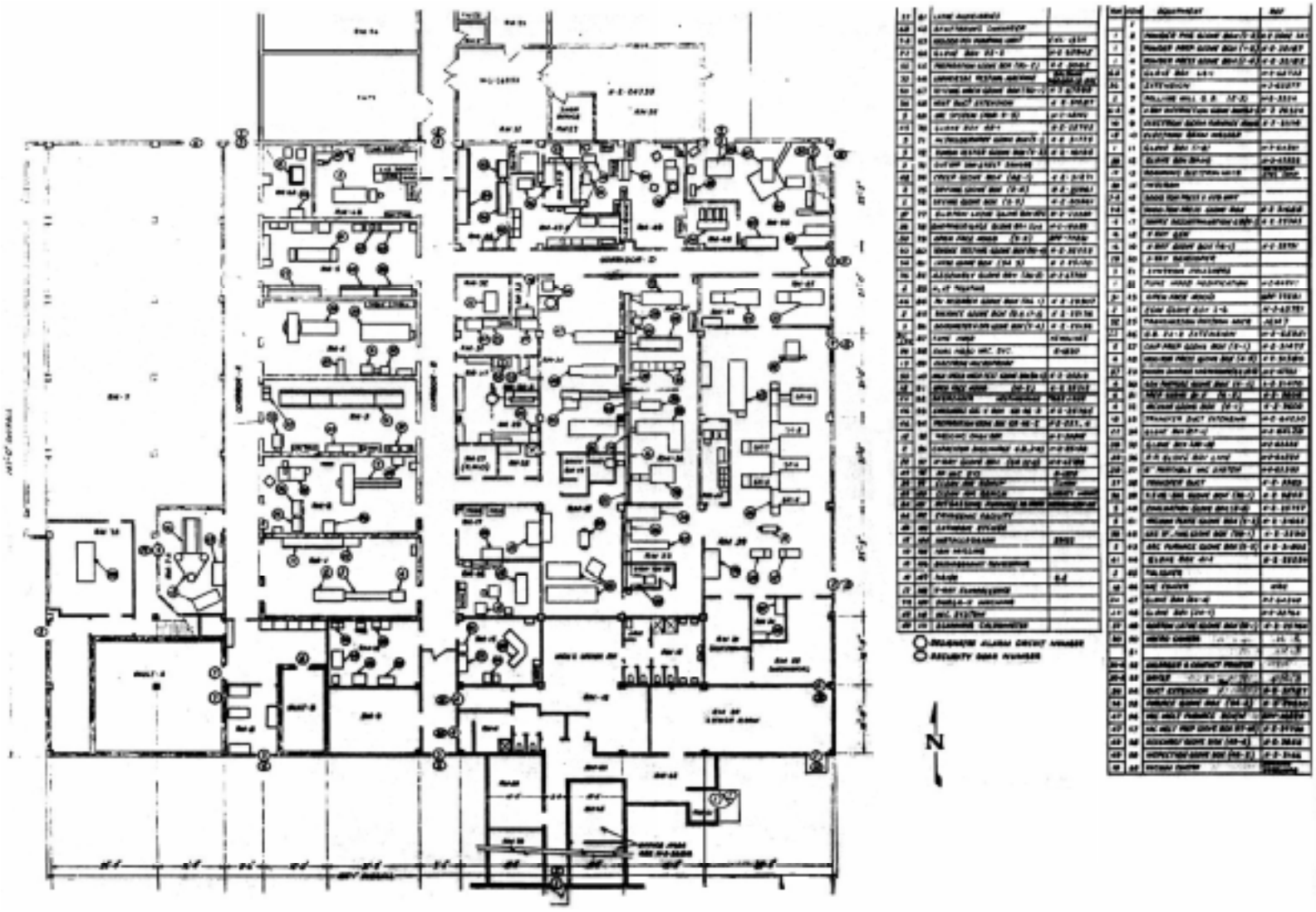
Williams, D.G. 1966. *Office Addition - 231-Z Building (Project No., BAP-010).* Directive No. AEC-270, Modification #2. U.S. Atomic Energy Commission, Richland, WA.



Drawing H-2-33169: Simplified Building Layout, 231-Z Building, 1964



Drawing H-2-65750: Architectural 231-Z Building, First Floor Plan, 1969



Drawing H-2-3520: 231-Z Building, First Floor Arrangement, 1965